

CLAIMS

1. A collapsible lens barrel comprising:
 - a first holding frame for holding a first lens group;
 - 5 a second holding frame for holding a second lens group that is disposed on an image plane side with respect to the first lens group;
 - an actuator for moving the second holding frame in an optical axis direction; and
 - a tubular cam frame comprising a plurality of cam grooves that are
 - 10 formed at substantially equal intervals around a circumferential direction for moving the first holding frame in the optical axis direction;
 - wherein the actuator is attached to a portion in the cam frame where the cam grooves are not formed.
- 15 2. The collapsible lens barrel according to claim 1, further comprising a detecting member for detecting a position of the second holding frame,
 - a substantially hollow cylindrical driving frame that is rotatable
 - around an optical axis and moves together with the first holding frame in the
 - 20 optical axis direction, and
 - a driving gear for rotating the driving frame,
 - wherein the cam grooves mate with the driving frame, and the driving frame moves in the optical axis direction along the cam grooves with a rotation of the driving frame, and
 - 25 the detecting member and the driving gear respectively are attached to the portion in the cam frame where the cam grooves are not formed.
3. The collapsible lens barrel according to claim 2, wherein the cam
- 30 frame is molded out of a resin by using a molding die, which is a combination of a plurality of molding die parts, and
 - at least one of the plurality of cam grooves formed on the cam frame
 - and at least one of mounting portions of the actuator, the detecting member
 - and the driving gear are molded with a common molding die part.
- 35 4. The collapsible lens barrel according to claim 1, further comprising at least two rod-like guide members parallel with each other whose one end is fixed to the first holding frame,

wherein the second holding frame is held slidably by the guide members.

5 5. The collapsible lens barrel according to claim 4, wherein each of the
guide members is fixed to the first holding frame by being press-fitted into
two through holes penetrating in the optical axis direction that are spaced
from each other.

10 6. The collapsible lens barrel according to claim 1, wherein a gap is
provided between the first lens group and the first holding frame in a
direction perpendicular to an optical axis, and the first lens group and the
first holding frame move toward the image plane side and a front end of the
actuator enters the gap at a time of non-capturing.

15 7. The collapsible lens barrel according to claim 1, further comprising a
substantially hollow cylindrical driving frame that rotates around an optical
axis relative to the cam frame, thereby moving together with the first holding
frame in the optical axis direction,

20 wherein the driving frame comprises mating members for mating
with the cam grooves, and

wide portions whose width along the optical axis direction is
increased are formed in the cam grooves so that the mating members do not
contact the cam grooves when the first lens group is moved furthest to the
image plane side.

25 8. The collapsible lens barrel according to claim 1, further comprising a
detecting member disposed for detecting an absolute position of the second
holding frame in the optical axis direction when the second holding frame is
at a position furthest to the image plane side or in the vicinity thereof.

30 9. The collapsible lens barrel according to claim 8, wherein the position
furthest to the image plane side substantially is a telephoto end position in
an optical system.

35 10. An optical instrument to which the collapsible lens barrel according to
claim 1 is attached, the optical instrument comprising:

a storing system capable of storing an optical zooming factor at a time

of turning off a power as an initial optical zooming factor information;

wherein, in the case where the initial optical zooming factor information is stored in the storing system, the second lens group is moved to and stopped at an optical zooming factor position based on the initial optical
5 zooming factor information when the power is turned on.

11. An optical instrument to which the collapsible lens barrel according to claim 1 is attached, the optical instrument comprising:

an input system for inputting an optical zooming factor at a time of
10 turning on a power; and

a storing system for storing the optical zooming factor inputted from the input system as an initial optical zooming factor information;

wherein, in the case where the initial optical zooming factor information is stored in the storing system, the second lens group is moved to
15 and stopped at an optical zooming factor position based on the initial optical zooming factor information when the power is turned on.